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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,253	06/25/2004	Kenji Ito	Q81941	8926

23373 7590 10/05/2005

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EXAMINER	
ELVE, MARIA ALEXANDRA	

ART UNIT	PAPER NUMBER
1725	

DATE MAILED: 10/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/500,253	ITO ET AL.	
	Examiner	Art Unit	
	M. Alexandra Elve	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *6/25/04*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/24/05, 6/25/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not known what "a pulse beam on time of 10s" is referring to.

Claims 8 & 10 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: there is no mention of using two lasers or two laser beams or the splitting of the beam. Consequently the simultaneous processing irradiation and hardening irradiation is structurally impossible.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 & 4-5 are rejected under 35 U.S.C. 102(b) as being anticipate by Owen et al. (USPN 5,841,099).

Owen et al. discloses the use of laser pulses to form vias in a multilayered target. A first laser output of high power density processes the metallic layer while a second

lower power density processes the dielectric layer. Energy densities range from 2.3 to 28.72 J/cm^2, (one being 14.87 J/cm^2). In one preferred embodiment, a first laser output of high intensity is used to process the metallic layer and a second laser output of equal intensity and greater spot size is used to process an underlying dielectric layer. Conventional CO^2 lasers typically generate laser output wavelengths of about 10.6 um. (abstract, figures, col. 2, lines 44-67, col. 3, lines 1-50, col. 11, lines 25-49, cols. 13-14)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-3 & 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. as stated in the above paragraph and further in view of Hino (USPN 6,037,103).

Owen et al. discloses the use of a resin and a range of energy densities but does not teach the presence of a polyimide or an energy density less than 2.3 J/cm^2.

Hino discloses a method for forming holes in a printed wire board. The resin layer is not particularly limited as long as holes can be formed therein by a laser beam output from a laser source and it has an electric insulating property. Examples of the resin include polyester resin, epoxy resin, urethane resin, polystyrene resin, polyethylene

resin, polyamide resin, polyimide resin, ABS resin, polycarbonate resin, silicone resin and the like. Of these resins, polyimide resin having superior heat resistance, chemical resistance and mechanical strength is preferred.

The energy density for resin and debris removal is 500 mJ/cm^2 (that is, 0.5 J/cm^2). (abstract, figures, col. 4, lines 50-60, col. 7, lines 10-15, col. 8, lines 24-60, col. 9, lines 50-65, col. 10, lines 13-50)

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a polyimide resin and an energy density of 0.5 J/cm^2, as taught by Hino, in the Owen et al. processing because polyimide is a resin and has superior properties and energy densities of greater than 0.2 J/cm^2 are required in order to reach the residue decomposition energy threshold, thus 0.5 J/cm^2 meets the threshold without cause undue board damage.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. and Hino as stated in the above paragraph and further in view of Kurosawa et al. (USPN 6,373,026)

Owen et al. and Hino teach a processing time of about 5 ms but not 10us.

Kurosawa et al. discloses a laser beam machining method for a wiring board. The beam irradiation time ranges from 10 to 200 us, with an energy density of about 20 J/cm2 or more. Thus the wiring board may be drilled to form a through-hole, a blind via hole, grooving and cutting. (abstract, figures, col. 2, lines 55-67, col. 3, lines 25-35, col.

4,lines 40-50, col. 5, lines 15-40, col. 10, lines 15-45, col. 11, lines 33-40, col. 12,lines 9-14)

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a processing time, as taught by Kurosawa et al., in the Owen et al. and Hino process because shorter processing times optimize the manufacturing process and minimize damage.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See US PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Alexandra Elve whose telephone number is 571-272-1173. The examiner can normally be reached on 6:30-3:00 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on 571-272-1171. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 30, 2005.

M. Alexandra Elve
Primary Examiner 1725